

REMARKS

Claims 1-2, 4-7, and 9 are active. Claims 1, 2, 4-7 and 9 are rejected under 35 USC 103 as being unpatentable over Bao in view of Carey '550 and further in view of Shi '640.

Claims 1-2, 4-7 and 9 were previously submitted for the Examiner's reconsideration in the response filed Nov. 12, 2008 and entered. However, that response did not place the claims in condition for allowance. An Advisory Action dated Nov. 25, 2008 sustains the rejections of the Action of Aug. 6, 2008 in view of that Nov. 12 filed response. This paper is supplementary to the Nov. 12, 2008 filed response.

Amended claims 1-2, 4-7 and 9 are submitted for the examiner's reconsideration.

Claim 1 is rejected as being unpatentable over the article by Bao, Carey '550 and Shi '640. Applicants traversed this rejection in their prior filed response and the remarks of that paper are repeated herein.

Amended claim 1 calls for:

In an electronic organic component, the combination comprising:
a substrate of the electronic component; and
an organic semiconductor functional layer coated on the substrate;

wherein said substrate comprises a biaxially stretched (well-ordered) plastic film such that the orderliness of the plastic film forms the applied functional layer into a well-ordered layer to thereby improve the electrical on/off properties of the component (underlining added)

This amended claim 1 includes the structure wherein the on/off properties of the component are improved. This improved on/off properties is inherent in the structure

employing the biaxially stretched substrate. A corresponding amendment is made to the substitute specification. This amendment comprises inherent theory of operation material under MPEP 2163.07(a) and is set forth as such by the enclosed declaration of Dr. Fix. The MPEP states:

By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter. *In re Reynolds*, 443 F.2d 384, 170 USPQ 94 (CCPA 1971); *In re Smythe*, 480 F. 2d 1376, 178 USPQ 279 (CCPA 1973).

Thus, it is not new matter to add the fact that the improved properties relate to an a heretofore unrecognized improvement in the on/off properties of the electronic component, e.g., an organic transistor. The specification is amended accordingly as permitted by the MPEP and the cited case law.

The biaxially stretching of a substrate to improve the electrical on/off operating properties of a coated organic semiconductor layer on the substrate is not suggested by the cited references taken individually or in combination. The reasoning given in the prior filed response is not accepted in the Advisory stating that Bao discloses that biaxially stretched substrate material is known. Bao does not disclose such a biaxially stretched substrate. Perhaps the Advisory intended to refer to Carey. The Advisory states that the combination of Bao and Shi [Carey?] are obvious in view of Bao's [sic

Shi??] disclosure to enhance carrier mobility between source and drain regions as noted in Note 2, page 5, of the prior final Action.

This statement is not clear because it is believed that Carey is intended as one of the cited references and thus is ambiguous as to what in fact the Action statement is stating other than it is continuing the statement of Note 2 of the prior Action. That note 2 states the Shi enhances carrier mobility between the source and drain electrodes. Because the Advisory is so unclear as to what it is saying, it is believed that it merely is continuing the rejections of the Final Action of Aug. 6, 2008. However, the Advisory in stating that "Bao discloses that biaxially stretched substrate material is known in the art to also provide enhanced operational characteristics for the transistor" has no support in any of the cited references and is plainly wrong. This statement is simply not true regardless which of the references are being referred to, Carey, Bao or Shi.

Shi discloses uniaxial stretching not biaxially stretching as asserted. Bao discloses no stretching. Carey discloses biaxially stretching of a substrate, but is silent as to its purpose other than possibly improving the optical properties of the substrate, which are not electrical operating properties as claimed in amended claim 1.

Bao discloses that higher mobilities have been obtained with a soluble precursor, right hand col. lines 5-10 from bottom of top paragraph. No organic semiconductor is disclosed as being coated on the substrate as claimed. Bao suggests higher mobilities are obtainable with a soluble precursor not relevant to stretching of a polymer substrate on which there is disclosed an ITO gate, on which is a polyimide layer and then the

semiconductor and thus teaches away from applicants' semiconductor coated substrate as claimed.

Carey is cited for disclosing biaxially stretching. This reference discloses a biaxially stretched PET plastic substrate. The purpose of the biaxially stretching is not disclosed despite careful review by applicants. Apparently this material has an excellent optical quality and perhaps, maybe implicitly, but not expressly disclosed, the biaxially stretching is a factor in such optical quality. Certainly there is no disclosure that such stretching enhances the operation of a transistor as asserted in the Advisory. This conclusion has no support in Carey.

The Examiner is respectfully requested to point out such support in this reference if he persists in this aspect of the rejection, because applicants can find no such support. No cited reference of record, Bao, Carey or Shi, supports the asserted conclusion that biaxially stretching of a plastic layer provides enhanced characteristics of a transistor, whatever this may mean, because the claim previously was directed to improved carrier mobility in an organic semiconductor, which may normally exhibit poor mobility as disclosed by Bao, right hand col. first paragraph, lines 17-22. It behooves the examiner to accurately depict the disclosure of the references at any time, much less in an Advisory Action after a final rejection. This is improper. Applicants are entitled to fair consideration of the references without speculative assumptions as to their disclosures, improperly deriving such conclusions only from applicants' disclosure.

Further, Carey discloses an inorganic insulation layer 11 next to the stretched substrate 10, not an organic semiconductor as claimed. The effect of the substrate being biaxially stretched on the insulation layer is not disclosed by Carey. An a-Si film is then deposited on the insulation layer 11. Col. 3, lines 50-60. This film is irradiated with one or more laser pulses. Col. 3, lines 63-67, which irradiation produces a fully or partially crystalline channel which has much higher ON currents, higher mobilities, and lower threshold voltages than TFTs with a-Si channel material. Col. 3, line 63 to col. 4. line 5. Thus the increased mobility and higher ON currents is due to pulsed lasers and not a biaxially stretched film as claimed, not relevant to the Carey disclosure.

If the Carey film is not irradiated, it will remain as a-Si and exhibit lower ON and OFF currents and lower mobilities. Thus Carey teaches that to improve the electrical properties of an a-Si film, such as to increase its ON/OFF ratio, it should be irradiated with laser pulses. This has nothing to do with and is irrelevant to the biaxially stretching, which in any case is not even disclosed as contacting the a-Si film, which is not an organic semiconductor coated on a biaxially stretched substrate as claimed. The Carey disclosure is totally irrelevant to applicants' claim 1 and is cited only for its irrelevant disclosure of a biaxially stretched substrate not related to amended claim 1. There is no support in Carey that the disclosed biaxially stretched film in any way will contribute to improved electrical properties of an electronic component as claimed in amended claim 1.

The Action then bootstraps the non-relevant disclosures of Bao and Carey with Shi. But Shi is also not relevant. It discloses a uniaxially stretched plastic substrate on which is a semiconductor layer. But uniaxial stretched plastic is not biaxially stretched plastic film substrate as claimed in claim 1 and the other references do not provide any help otherwise as discussed above. There is no suggestion in Carey that biaxially stretched plastic will provide improved electrical on/off operating properties in a semiconductor layer coated thereon as claimed. That is applicants' contribution and not that of the references.

Enclosed is a Declaration of Dr. Walter Fix, who is knowledgeable and experienced in this art and may be deemed as one of ordinary skill in this art. See the attachment to his declaration. See paragraphs 10-16 of his declaration which contradict the conclusions of the Actions. Dr. Fix states, for example, in paragraph 13:

"I am aware of tests conducted by my employer, that have shown **unexpected and surprising improved electrical properties** on an electrical component, such as in a transistor, comparable to that claimed in amended claim 1 above. These results have shown to me that there are improved properties in the electrical component employing the amended claim 1 structure, i.e., enhanced performance of the component regarding its ON/OFF ratio and thus an improved performance wherein the component is operative with a more desirable lower initial voltage with the structure as claimed in the above amended claim 1."

"This enhanced performance from a biaxially stretched substrate is not understood, unexpected and surprising to me. As stated in certain paragraphs above, the higher order created by the uniaxial stretching of Shi is no longer present and thus the uniaxial advantage of Shi's device appears to be no longer present. I believe the improved electrical on/off performance of a component constructed as in amended claim 1 may be attributed to interfacial effects by the transverse and biaxially stretching action.

These interfacial effects may be created by the change in distance between the strings as a result of the biaxially stretching. To me, intuitively, the reduction of the higher order orientation of the plastic material by the biaxially stretching would otherwise seem to result in a reduced ON/OFF ratio, and thus not an improved electrical performance as claimed.

This increase in the improvement of the electrical property thus results in enhanced performance of the component incorporating the subject matter of the above recited claim 1. This enhanced performance was totally **unexpected**, especially in view of **Shi, which does not teach such enhanced performance of a semiconductor coated on such a biaxially stretched polymer substrate.** (bold and underlining added)

Thus, contrary to the Action, I would not be motivated by Shi to combine it with the Bao and Carey disclosures as suggested. That combination is suggested by the above-entitled application and not by these references.”

As per paragraphs 14 and 15 of the declaration, the enhanced performance relates to the improved ON/OFF ratio of the component, i.e., the difference in current density of the component when off (no voltage applied) as compared to when it is on (voltage applied). That is, the component may be turned on with a lower voltage that otherwise might be possible due to the presence of lower background current due to the presence of the biaxially stretched substrate. This desirable feature of the ON/OFF ratio improvement is not recognized by the cited prior art. A lower turn on voltage is always more desirable than a higher turn on voltage.

While this theory of improved ON/OFF ration was not expressed in the original filed specification, what is expressed is an electrical component with improved electrical operating properties, e.g., the higher carrier mobility as disclosed. While this theory may or may not be the reason for the improved electrical properties, as recognized by Dr.

Fix, the claims are directed to improved electrical on/off properties of the component due to the biaxially stretched substrate, which properties are inherent in the as filed specification. An applicant may not always understand the correct theory as to why a given disclosed structure is improved, but only recognizes that the structure does result in an improved device. An applicant is entitled to claim that which he regards as his invention.

Dr. Fix, who is not one of the inventors, recognizes that the claim 1 structure results in improved electrical on/off operating properties in the electronic component, and even he is not clear as to the theory as to what causes the biaxially stretched plastic substrate coated with an organic functional semiconductor layer to exhibit improved electrical on/off operating properties in the resulting component. However, he believes the improvement lies in the improved ON/OFF ratio and, thus, the turn on voltage of the component.

Reference is made to MPEP 2163.07(a) cited above. What this means is that the amended claim 1 directed to an improved electrical on/off operating property in the electronic component comprising a functional semiconductor layer coated on a biaxially stretched substrate sufficiently distinguishes applicants' improvement in amended claim 1 over the cited references. This claim is directed to what applicants regard as their invention, an improved electronic component comprising exhibiting the improved electrical on/off operating properties of amended claim 1. None of the cited references of record suggest such a component wherein the component exhibits improved

electrical on/off operating properties where the component comprises an organic semiconductor functional layer coated on a biaxially stretched substrate.

Dr. Fix, one of ordinary skill in this art, is not suggested by Shi to combine it with Bao and Carey as suggested by the Actions because what is claimed is missing in these references. None of the cited references suggest the unexpected discovery of the inventors of the above-entitled application, as manifested by the enclosed declaration, that biaxially stretching of a plastic substrate would or even could enhance the electrical on/off operating properties of an organic semiconductor coated on the substrate. There is no support in any of these references that there is improved electrical operating properties of such a semiconductor enhanced by the biaxially stretching.

Carey, cited for disclosing such biaxially stretching, at best only implies it might be used for improving optical properties of the substrate and certainly not for providing improved electrical operating properties of an adjacent semiconductor not disclosed by Carey. Bao suggests increasing carrier mobility by using a soluble precursor. Carey suggests irradiation of a-Si with pulsed laser beams. Shi suggests only uniaxial stretching to enhance a semiconductor mobility in the source-drain electrode directions. The combination of these references to provide improved electrical properties of the component as claimed as suggested by the Action comes only from applicants' disclosure.

Applicants have discovered that biaxially stretching provides improved electrical on/off operating properties not otherwise recognized by the Shi uniaxially stretching as reinforced by the enclosed declaration of Dr. Fix. Shi thus teaches away from combining its disclosure with Bao and Carey to create applicants' claimed structure in view of their express disclosures to this issue, which references teach away from and thus are not relevant to the Shi disclosure for the reasons given. Teaching away is the antithesis of obviousness. Thus one of ordinary skill would not want to combine Shi with Bao or Carey because Shi and these references per se teach otherwise. Carey and Bao do not point to any problem with the Shi disclosure or that there would be any advantage in biaxially stretching the substrate of Shi in the resulting deposited semiconductor material or other improvement in the electrical operating properties in an electronic component as expressed by Dr. Fix. Claim 1 is believed unobvious over these references and thus allowable.

Independent claims 5 and 7 include similar subject matter as claim 1 and are believed equally allowable.

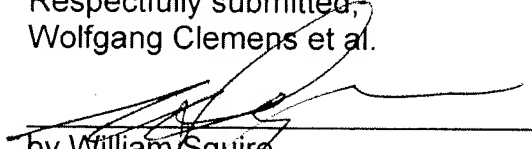
The remaining claims 2, 4, 6, and 9, depend from the independent claims, include all of the subject matter of the claims from which they depend and are believed allowable at least for three reasons as well as the additional claimed elements or steps not shown or disclosed in the cited references. These claims are believed allowable.

Since claims 1-2, 4-7 and 9 have been shown to be in proper form for allowance, such action is respectfully requested.

This paper accompanies an RCE, the \$810 fee for which is being requested to be charged to deposit account 03 0678 as well as the two month extension of time fee of \$490. The Commissioner is authorized to charge any additional fee due for this paper to deposit account 03 0678 or credit the deposit account for any overpayments in connection with this paper.

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